Snow Coverage Area for the Sierra Nevada –February 1, 2008

The following analysis of **S**now **C**overed **A**rea (SCA) is derived from MODIS (Moderate Resolution Imaging Spectroradiometer) aboard NASA's Terra and Aqua satellites. Data from MODIS are processed to provide a resolution of 500 meters and a fractional SCA product where each pixel can range in value between 0 and 100% (e.g. 50%=50% of the 500 meter pixel is covered by snow) as opposed to the operational binary product that defines a pixel as either snow or snow free. The MODIS SCA product is available on a daily basis, but viewable areas are subject to cloud cover. In addition, tree canopies mask a portion of the SCA and should be viewed accordingly based on the vegetation characteristics of each hydrologic unit and watershed.

This analysis covers the Sierra Nevada and various river basins, with Figure 1 highlighting the SCA over the Sierra Nevada, and Figure 2 showing the daily SCA in various river basins in January 2005 and 2007. Figures 3 (a-e) focuses on the **Feather**, **American, Tuolumne, Merced, and Kaweah** River basins. The years 2007 and 2005 are used to represent the extreme variability that the Sierra's have experienced and provide a current benchmark for comparison. Additional basins will be added throughout the year and upon request.

These data and analysis are made available by the University of California, Merced and University of California, Santa Barbara under *NASA Grant NNG04GC52 (REASoN CAN 'Multi-resolution snow products for the hydrologic sciences')* and *California Department of Water Resources Agreement 4600007954.*

For further information or comments/suggestions please contact Robert Rice (rrice@ucmerced.edu or (209)228-4397).

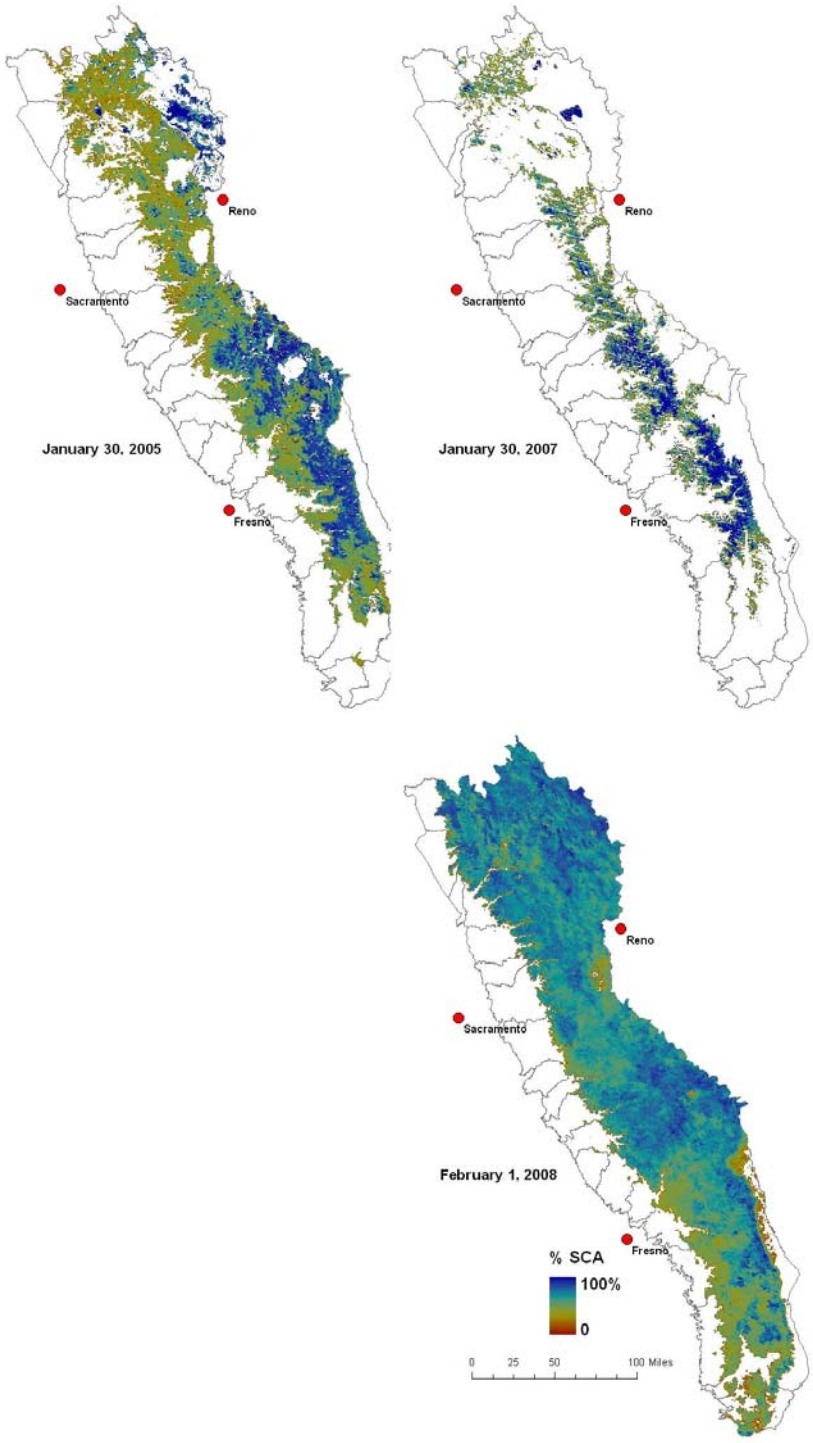


Figure 1. SCA over the **Sierra Nevada** on January 30, 2007/2005 and February 1, 2008 outlined by the individual watersheds. Evident is the extent of snowcover between January 2008 and 2007 in which the statewide snow water equivalent (SWE) on February 1, 2008 was 131% of the historical February 1 average, while the February 1, 2007 was 39% of the February 1 average. On February 1, 2005 the Sierra Nevada was 163% of the February 1 average.

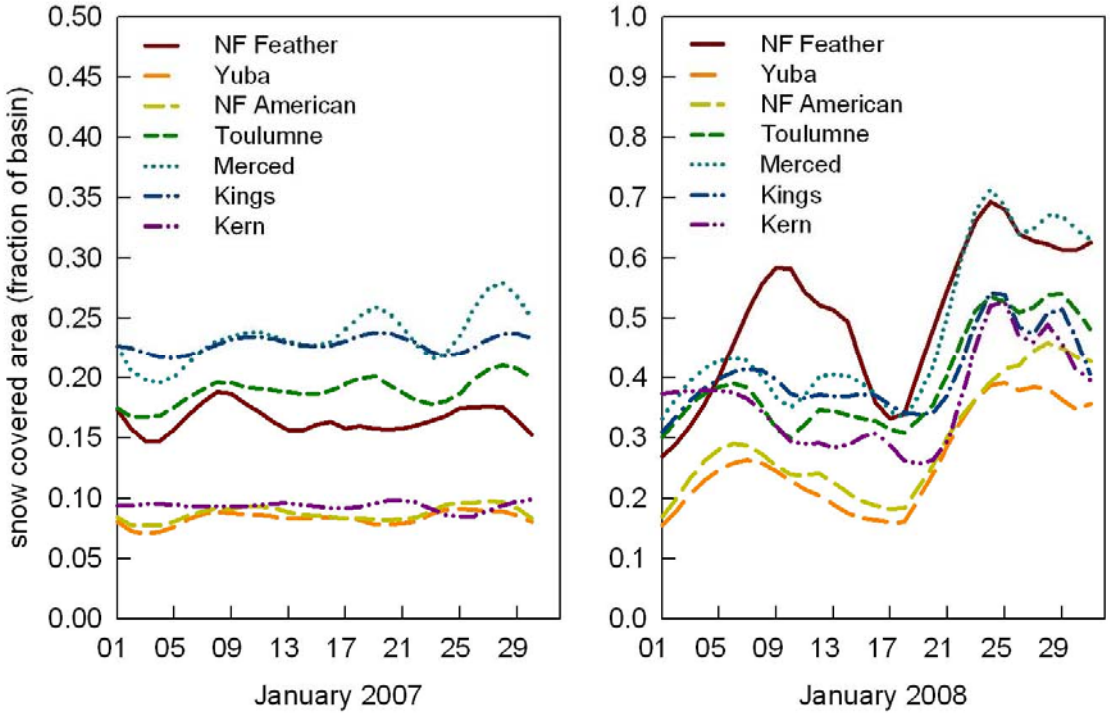
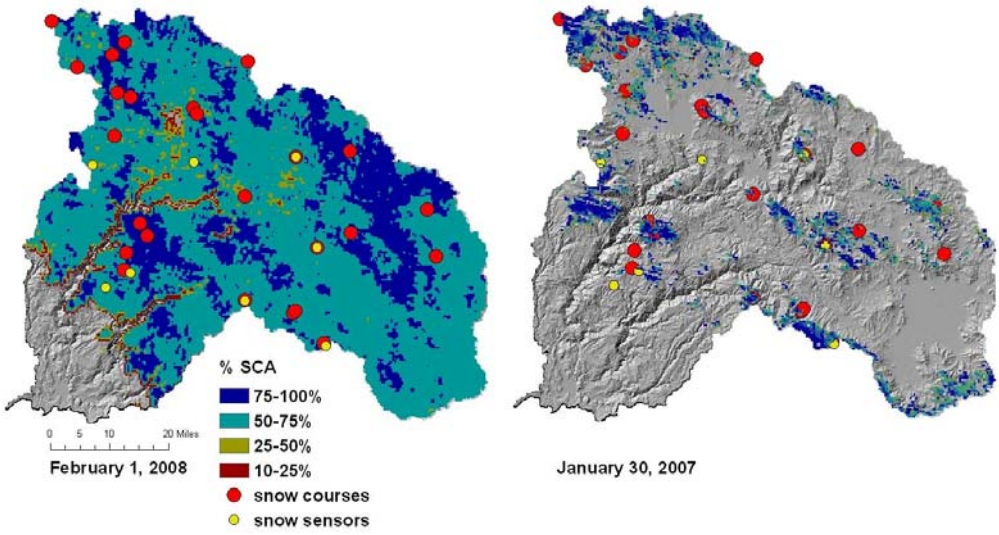
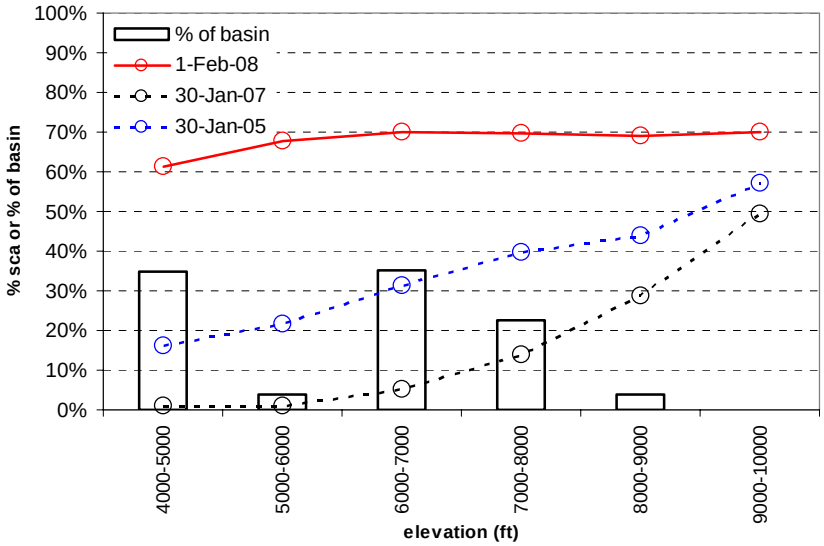


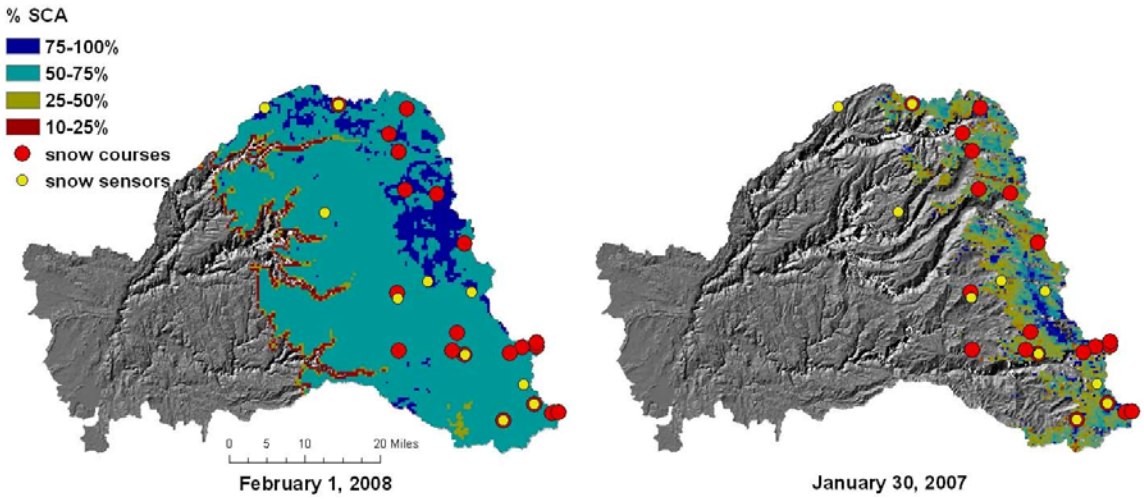
Figure 2. The graphs show the daily January 2007 and 2008 progression of SCA, expressed as a fraction of the basin area (e.g. 0.25 = 25%) in the Sierra Nevada (above the Central Valley) and shows significant differences between the January 2007 and 2008 snow covered area in 8 river basins.

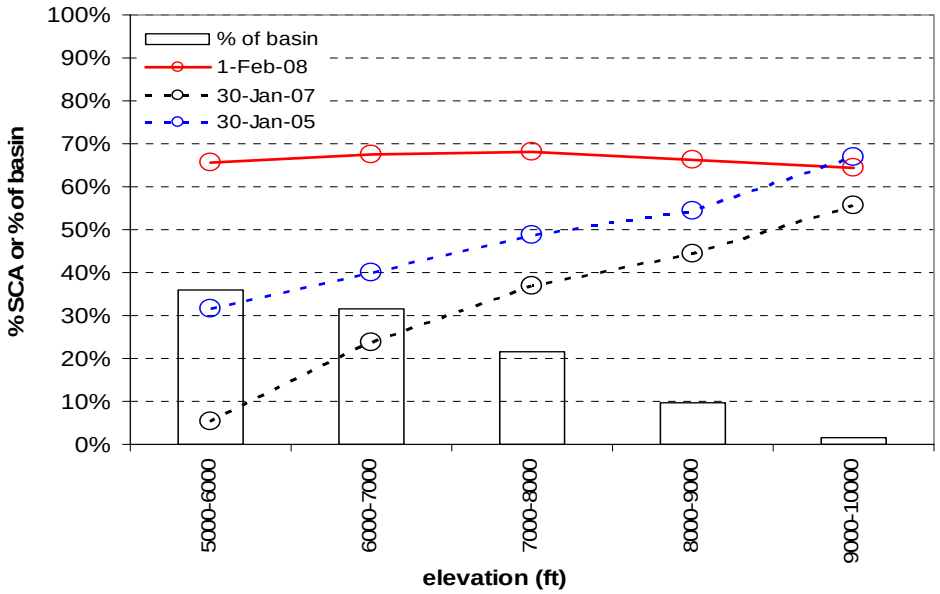




	February 1, 2008	January 30, 2007	January 30, 2005
4000-5000	61%	1%	16%
5000-6000	68%	1%	22%
6000-7000	70%	5%	31%
7000-8000	70%	14%	40%
8000-9000	69%	29%	44%
9000-10000	70%	49%	57%

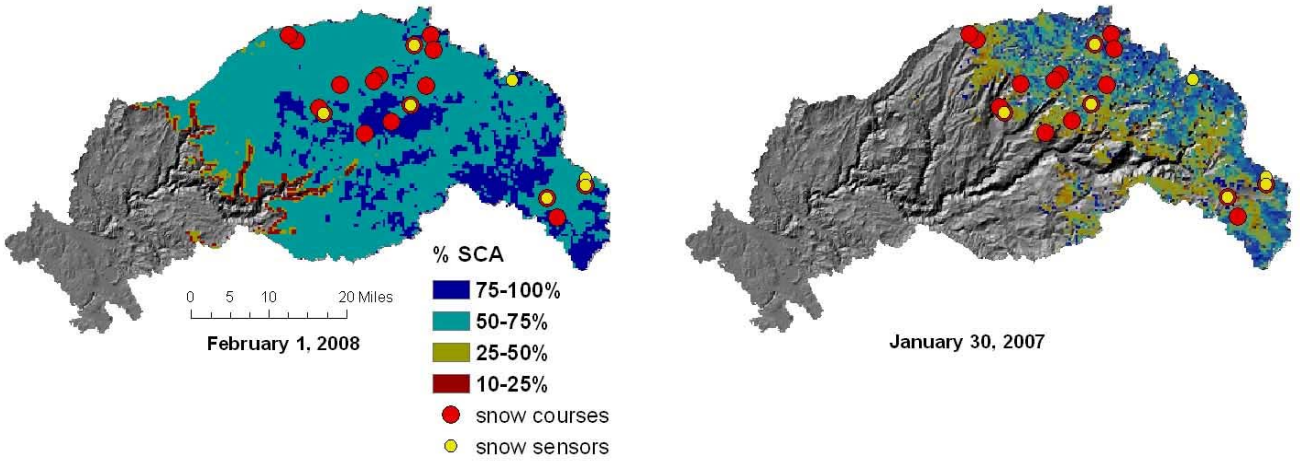
Figure 3(a). SCA over the **Feather River** Basin on February 1, 2008 and January 30, 2007. On February 1, 2008 basin-wide SWE was 134% of the February 1 historical average (based on basin-wide snow course data), while February 1, 2007 was 38% of the February 1 average. On February 1, 2005 basin-wide SWE was 128% of the February 1 historical average. Graphical and tabular data represent average % SCA by 1000 foot elevation bands over the **Feather River** Basin for February 1 2008 and January 30, 2007/2005.

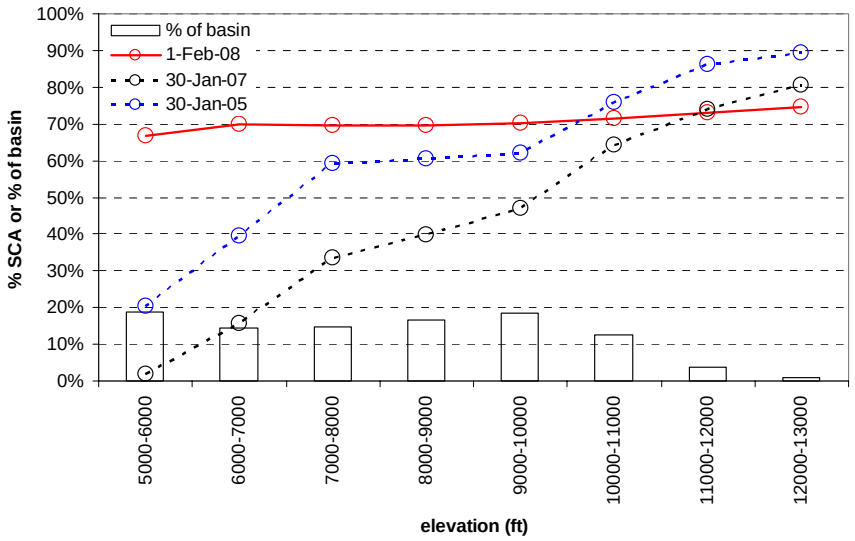




	February 1, 2008	January 30, 2007	January 30, 2005
5000-6000	66%	5%	31%
6000-7000	68%	24%	40%
7000-8000	68%	37%	49%
8000-9000	66%	44%	54%
9000-10000	64%	56%	67%

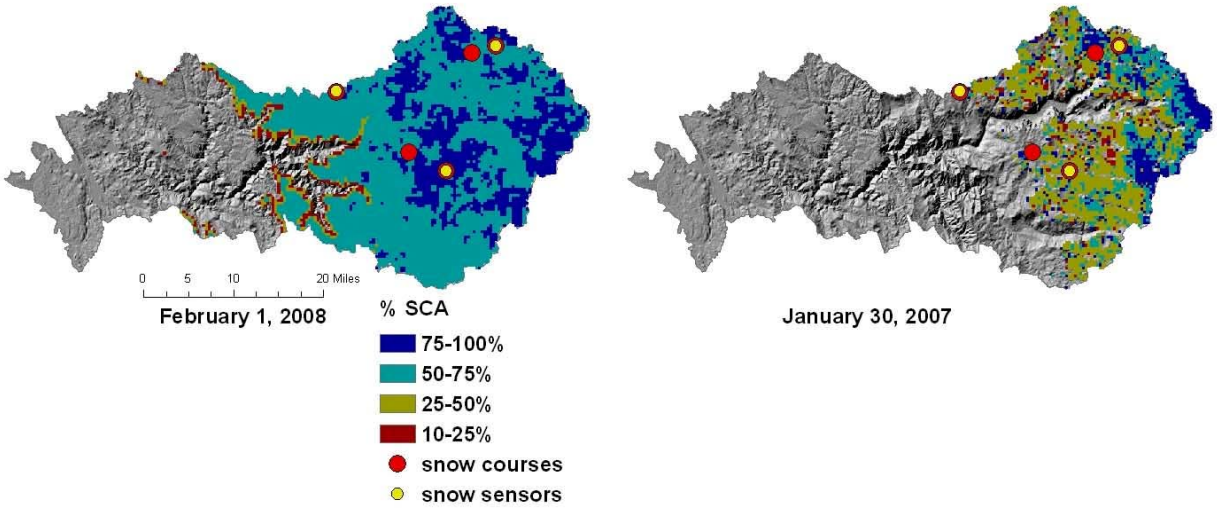
Figure 3(b). SCA over the **American River** Basin on February 1, 2008 and January 30, 2007. On February 1, 2008 basin-wide SWE was 129% of the February 1 historical average (based on basin-wide snow course data), while February 1, 2007 was 38% of the February 1 average. On February 1, 2005 basin-wide SWE was 174% of the February 1 historical average. Graphical and tabular data represent average % SCA by 1000 foot elevation bands over the **American River** Basin for February 1 2008 and January 30, 2007/2005.

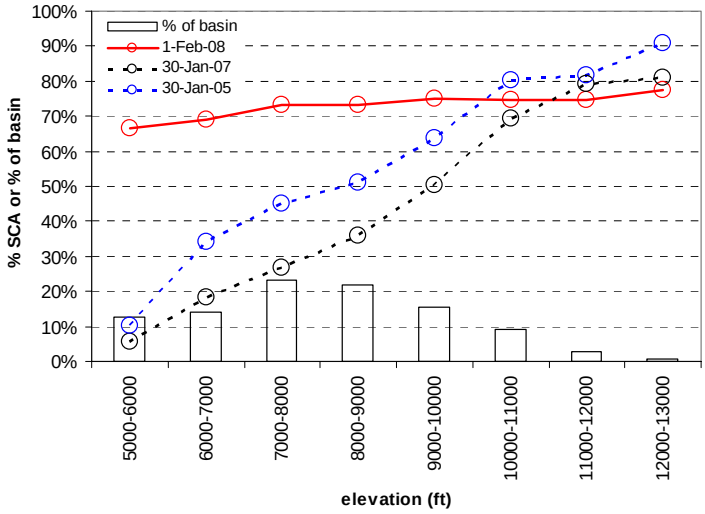




	February 1, 2008	January 30, 2007	January 30, 2005
5000-6000	67%	2%	20%
6000-7000	70%	16%	39%
7000-8000	70%	34%	59%
8000-9000	69%	40%	60%
9000-10000	70%	47%	62%
10000-11000	72%	64%	76%
11000-12000	73%	74%	86%
12000-13000	75%	80%	89%

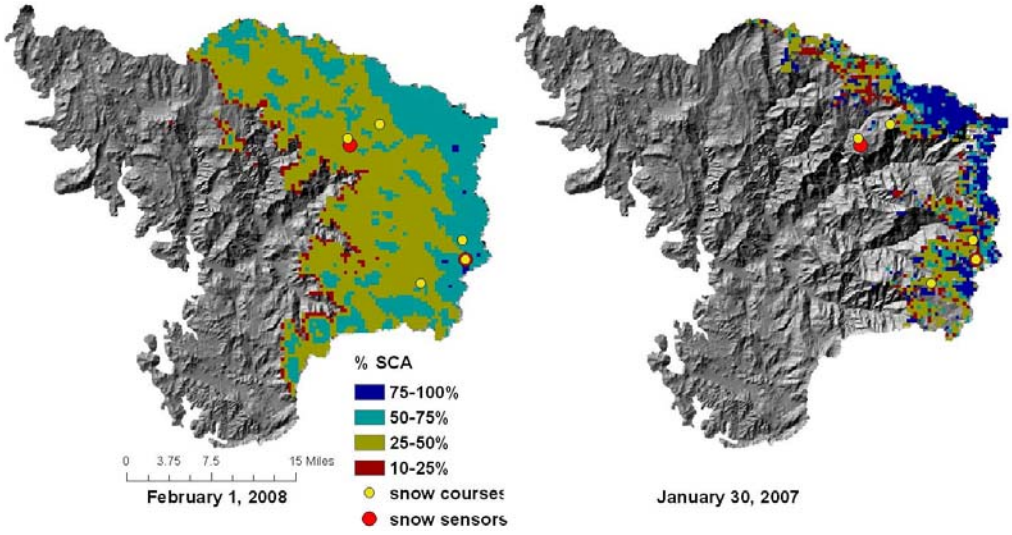
Figure 3(c). SCA over the **Tuolumne River** Basin on February 1, 2008 and January 30, 2007. On February 1, 2008 basin-wide SWE was 133% of the February 1 historical average (based on basin-wide snow course data), while February 1, 2007 was 43% of the February 1 average. On February 1, 2005 basin-wide SWE was 180% of the February 1 historical average. Graphical and tabular data represent average % SCA by 1000 foot elevation bands over the **Tuolumne River** Basin for February 1, 2008 and January 30, 2007/2005.

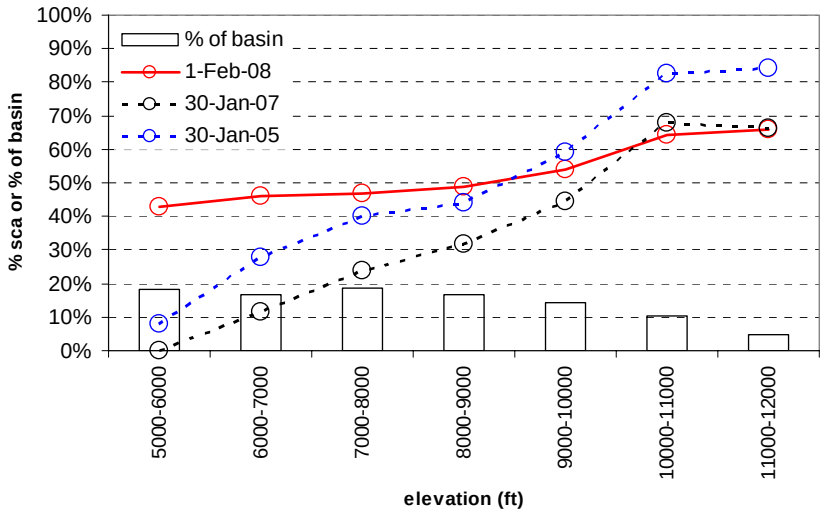




	February 1, 2008	January 30, 2007	January 30, 2005
5000-6000	67%	6%	10%
6000-7000	69%	18%	34%
7000-8000	73%	27%	45%
8000-9000	73%	36%	51%
9000-10000	75%	50%	64%
10000-11000	75%	69%	80%
11000-12000	75%	79%	82%
12000-13000	77%	81%	91%

Figure 3(d). SCA over the **Merced River** Basin on February 1, 2008 and January 30, 2007. On February 1, 2008 basin-wide SWE was 125% of the February 1 historical average (based on basin-wide snow course data), while February 1, 2007 was 41% of the February 1 average. On February 1, 2005 basin-wide SWE was 180% of the February 1 historical average. Graphical and tabular data represent average % SCA by 1000 foot elevation bands over the **Merced River** Basin for February 1, 2008 and January 30, 2007/2005.





	February 1, 2008	January 30, 2007	January 30, 2005
5000-6000	43%	0%	8%
6000-7000	46%	11%	28%
7000-8000	47%	24%	40%
8000-9000	49%	32%	44%
9000-10000	54%	44%	59%
10000-11000	64%	68%	83%
11000-12000	66%	66%	84%

Figure 3(e). SCA over the **Kaweah River** Basin on February 1, 2008 and January 30, 2007. On February 1, 2008 basin-wide SWE was 110% of the February 1 historical average (based on basin-wide snow course data), while February 1, 2007 was 43% of the February 1 average. On February 1, 2005 basin-wide SWE was 194% of the February 1 historical average. Graphical and tabular data represent average % SCA by 1000 foot elevation bands over the **Kaweah River** Basin for February 1, 2008 and January 30, 2007/2005.